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(54) Method of treating waste solution of non-silver halide light-sensitive material.

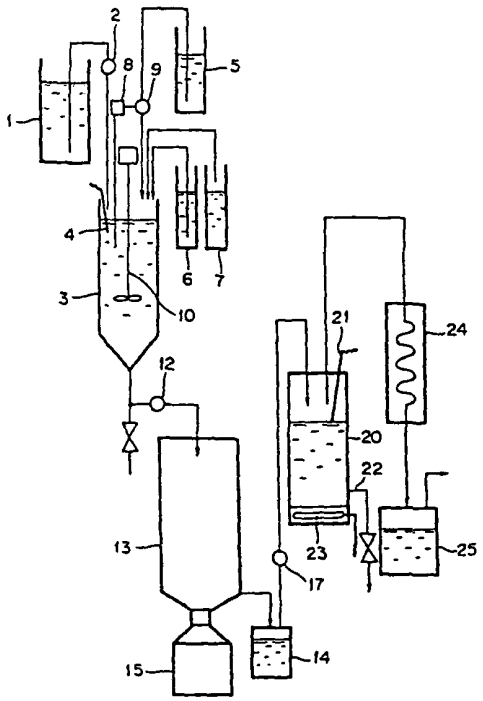
(57) Disclosed is a method of separating a waste solution of a non-silver halide light-sensitive material into liquid and solid comprising the steps of:

adding at least one of a neutralizer and a flocculant to the waste solution under stirring to precipitate solid,

subjecting the mixture to centrifugal filtration to separate it into filtrate and the precipitated solid, and

concentrating the filtrate by heating to further separate it into liquid and solid, by which solid and liquid can be separated sufficiently.

FIG. 1



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As the neutralizer to be added to a waste solution in the chemical processing step of the present invention, an acid or an alkali is used. The acid may include, for example, sulfuric acid, hydrochloric acid, phosphoric acid, oxalic acid, citric acid and tartaric acid, and the alkali may include, for example, calcium hydroxide, sodium hydroxide, potassium hydroxide, sodium carbonate and an organic amin .

When the neutralizer is added to a waste solution, the pH of the waste solution to which the neutralizer is added is preferably controlled by using a pH meter. The pH of the waste solution after the neutralizer is added is preferably in the range of 5 to 9, more preferably in the range of 6 to 8.

As the flocculant to be added to a waste solution in the chemical processing step of the present invention, there may be preferred an inorganic flocculant such as aluminum sulfate, magnesium sulfate, polyaluminum chloride, calcium chloride and magnesium chloride; and an organic flocculant such as a polyacrylamide type polymer and polyacrylic acid (salt). The amount of the flocculant to be added is preferably in the range of 0.1 to 20 % by weight based on a waste solution.

In the chemical processing step of the present invention, the neutralizer and the flocculant may be added in combination. In that case, the flocculant is preferably added simultaneously with or after addition of an acid or an alkali.

In the chemical processing step of the present invention, in addition to the neutralizer or flocculant, a filter aid is preferably added, and as the filter aid, active carbon is preferably used.

As the filter aid, there may be mentioned, in addition to active carbon, diatomaceous earth, a cellulose type aid and other mineral type aids (e.g. pearlite). As a commercially available filter aid, there may be mentioned Radiolite #100, #700 and #800 (trade names, produced by Showa Kagaku Kogyo K.K.) as a diatomaceous earth filter aid; FIBRA-CEL SW-10 and BH-40 (trade names, produced by Nippon Keisodo K.K.) as a cellulose type filter aid; and Celite Hyflo Super-Cel (trade name, produced by Nippon Keisodo K.K.), Topkoperlite #36 and #37 (trade names, produced by Nippon Keisodo K.K.) and asbestos as a filter aid of minerals other than diatomaceous earth. The amount of the filter aid to be added is preferably in the range of 0.05 to 10 % by weight based on a waste solution to which the filter aid is added. The addition time is preferably simultaneously with or before addition of the neutralizer.

In the chemical processing step of the present invention, when the neutralizer and/or the flocculant and the filter aid are added, a waste solution is so stirred that these agents are sufficiently mixed with the waste solution.

In the present invention, the waste solution chemically processed is subjected to centrifugal filtration. The centrifugal filter to be used for centrifugal filtration preferably has a longitudinally long and slender cylindrical shape. The filter medium preferably has an air flow rate of 0.5 to 300 ml/cm^2·sec, and a filter paper, cotton cloth, woven fabric and nonwoven facric using polyethylene fiber or polyvinyl chloride fiber may be used. The rotation number of the centrifugal filter is preferably 10 to 3,000 rpm.

In the present invention, the filtrate obtained by the chemical processing and centrifugal filtration is processed by a heat concentration step. In the processing of said heat concentration step, the filtrate obtained by the centrifugal filtration is heated in a heat concentration vessel, liquid components are evaporated and condensed to become liquid, and an evaporation residue is removed from the evaporation vessel as a concentrate or solid. The heat concentration is carried out under ordinary pressure or reduced pressure, and the concentration rate is preferably twice to 30 times, more preferably 5 to 20 times. The filtrate is concentrated to a half to one-thirtieth of its original volume. The heat concentration vessel is preferably made of a metal having a protective film such as stainless steel and a fluorine resin (Teflon, trade name), and vapor generated by the heat concentration is preferably liquified by condensation using a heat exchanger. In the present invention, as a heat concentration method, known techniques, for example, the technique disclosed in Japanese Provisional Patent Publication No. 157084/1990 may be used suitably.

In the following, an equipment example for practicing the method of the present invention is explained by referring to a drawing.

Fig. 1 is a schematic constitutional view for illustrating an example of an instrument for practicing the method of the present invention. In this figure, 1 is a waste solution tank charged with a waste solution discharged in a processing step of a non-silver halide light-sensitive material, and the waste solution in the waste solution tank 1 is delivered by a pump 2 to a chemical processing tank 3 in which a chemical processing is carried out. Here, by a liquid-level sensor 4 and a controlling mechanism not shown in the figure, the chemical processing tank 3 is constituted that operation of the pump 2 is stopped when the liquid is delivered up to a predetermined liquid level. In the chemical processing tank 3, a neutralizer is added from a neutralizer tank 5 charged with the neutralizer, a flocculant is added from a flocculant tank 6 charged with the flocculant, and active carbon is added from an active carbon tank 7 charged with the active carbon, respectively, to the waste solution in the chemical processing tank 3 in predetermined amounts. Here, operations of a liquid-delivering pump and a powder-feeding device not shown in the figure are so controlled that the flocculant and active carbon are added

ing a constitution in which a light-sensitive layer and a silicone layer as an ink-repellent layer are laminated on a support, and a developing solution therefor in combination, as disclosed in Japanese Provisional Patent Publications No. 149043/1989, No. 150142/1989, No. 154157/1989 and No. 154158/1989;

for example, a waste solution of a rinsing solution disclosed in Japanese Provisional Patent Publication No. 58253/1987, and a waste solution of a desensitizing solution disclosed in Japanese Provisional Patent Publication No. 58255/1987;

a waste solution generated by processing an electrophotographic lithographic printing plate having a photoconductive layer on a support, in which a toner image is formed by an electrophotographic method and a non-image portion of the photoconductive layer is removed to obtain a lithographic printing plate, for example, a waste solution generated by processing an electrophotographic lithographic printing plate as disclosed in Japanese Provisional Patent Publications No. 267954/1988 and No. 271481/1988; and

a development waste solution and a washing waste solution generated by development processings of a positive type proofing light-sensitive material containing a light-sensitive o-quinonediazide compound, a vinyl acetate type synthetic resin and a novolak type synthetic resin and a negative type proofing light-sensitive material containing a copolymer composition, a vinyl acetate type synthetic resin and a novolak type synthetic resin.

EXAMPLES

The present invention is described in detail by referring to Examples.

Example 1

A positive type light-sensitive lithographic printing plate ST-0117 (trade name, produced by Konica Corporation) with a size of 1,003 mm x 800 mm used as a non-silver halide light-sensitive material was processed with a developing solution having the following composition by using an automatic developer, washed with water used in cycles, and finally processed with a rinsing solution having the following composition.

Composition of developing solution

A potassium silicate (trade name, produced by Nippon Kagaku Kogyo K.K.)	2,000 g
Potassium hydroxide	300 g
Water	10 ℓ

Composition of rinsing solution

Sodium di(2-ethylhexyl)sulfosuccinate	150 g
Sodium dihydrogen phosphate·dihydrate	50 g
Citric acid·monohydrate	10 g
Phosphoric acid (85 %)	1.5 g
Water	5 ℓ

The waste solution tank 1 shown in Fig. 1 was charged with 12 ℓ of a waste solution of the developing solution with which 600 sheets of the above light-sensitive lithographic printing plates were processed, 15 ℓ of a washing waste solution and 5 ℓ of a waste solution of the rinsing solution, and processings wire carried out.

A cylindrical tank made of stainless steel having a volume of 3 ℓ was used as the chemical processing tank 3, and into the tank were added 60 ml of 10 % sulfuric acid as a neutralizer, 5 g of ash-free pulp (cellulose fiber) as a filter aid and 5 g of active carbon. When the mixture was stirred at normal temperature for 30 minutes, solid was precipitated. The pH of the liquid at this time was 3. This suspension was delivered to the centrifugal filter 13 at a flow rate of 100 ml/min, and filtered. A cylindrical centrifugal filter made of plastics having a volume of 7 ℓ was used as the centrifugal filter 13, and a filter paper having an air flow rate of 2 ml/cm^2-sec was used as a filter medium. The rotation number of the centrifugal filter was made 1,000 rpm. Th filtrat collected in the filtrate-storing tank 14 was delivered to th heat concentration vessel 20 by the pump 17. A cylindrical heat

printing plates, respectively, was processed by the instrument shown in Fig. 1. The procedures were carried out under the same conditions as in Example 1 except for using 70 ml of 10 % sulfuric acid as a neutralizer. The solid collected in the centrifugal filter 13 was about 8 kg, and stain due to sludge was not generated in the heat concentration vessel 20. The liquid collected in the distilled liquid-storing tank 25 was about 29 ℓ, and no inorganic salt was dissolved therein. Filtering property of the centrifugal filtration was constantly stable, and clogging of the filter medium was not caused.

According to the present invention, in a process of separating a waste solution of a non-silver halide light-sensitive material into solid and liquid, the solid and the liquid can be separated sufficiently, cost required for the process is low, and also labor required for the process can be reduced for a long time.

Claims

1. A method of separating a waste solution of a non-silver halide light-sensitive material into liquid and solid comprising the steps of:
   adding at least one of a neutralizer and a flocculant to the waste solution under stirring to precipitate solid,
   subjecting the mixture to centrifugal filtration to separate it into filtrate and the precipitated solid, and
   concentrating the filtrate by heating to further separate it into liquid and solid.
2. The method of Claim 1 wherein the neutralizer is an acid or an alkali.
3. The method of Claim 1 wherein the pH of the waste solution after addition of the neutralizer is 5 to 9.
4. The method of Claim 1 wherein the flocculant is an inorganic or organic flocculant.
5. The method of Claim 1 wherein the flocculant is added in an amount of 0.1 to 20 % by weight based on the waste solution.
6. The method of Claim 1 wherein the neutralizer and the flocculant are added in combination.
7. The method of Claim 1 wherein a filter aid is further added to the waste solution in an amount of 0.05 to 10 % by weight based on the waste solution.
8. The method of Claim 1 wherein the filtrate is concentrated to a half to one-thirtieth of its original volume.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 30 5860

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	US-A-3 966 600 (CROWLEY,T.N.) * column 2, line 45 - line 62 *	1-4	C02F1/52 C02F1/66 C02F1/04
Y,D	EP-A-0 357 170 (KONICA CORPORATION) * page 10, line 20 - line 30 * * page 11, line 40 - line 58 *	1-4	
A	DE-A-3 629 203 (GÜTLING GMBH) * column 1; claims *	1,2,4	
A	US-A-4 808 316 (OTOMURA,K.) * figure *	1,2,4,7	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) C02F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	02 OCTOBER 1992	GONZALEZ ARIAS,M.L.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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& : member of the same patent family, corresponding document

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